

REMARKS

This paper is submitted in reply to the Office Action dated March 15, 2005, within the three-month period for response. Reconsideration and allowance of all pending claims are respectfully requested.

In the subject Office Action, claims 1-3, 11-12 and 18-19 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,003,075 to Arendt et al. In addition, claims 4 and 25-26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. in view of U.S. Patent No. 6,769,008 to Kumar et al.; claims 15 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. further in view of U.S. Patent No. 6,438,705 to Chao et al.; claims 5-8, 13-14, 20-21 and 27-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and Kumar et al. in view of U.S. Patent No. 6,163,855 to Shrivastava et al.; claim 9 was rejected were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and further in view of Kumar et al. and Shrivastava et al.; claims 16 and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and further in view of Chao et al. and Shrivastava et al.; claims 29-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and Kumar et al. and further in view of Chao et al. and Shirvastava et al.; claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. further in view of Official Notice; claims 17 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and further in view of Chao et al. and Official Notice; and claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Arendt et al. and Kumar et al. and further in view of Chao et al. and Official Notice.

Applicants respectfully traverse the Examiner's rejections to the extent that they are maintained. In addition, in this paper, Applicants have amended claims 1, 11, 18 and 25, and Applicants respectfully submit that no new matter is being added by the above

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amendments, as the amendments are fully supported in the specification, drawings and claims as originally filed.

Now turning to the subject Office Action, and specifically to the rejection of independent claim 1, this claim generally recites a method of updating a cluster infrastructure version used by a group resident in a clustered computer system of the type including a plurality of nodes. The method includes updating the cluster infrastructure software in individual nodes in the clustered computer system while the group is maintained in an active state. After the cluster infrastructure software is updated, the group is notified of the update to the cluster infrastructure software, and in response to the notification, a cluster infrastructure version used by the group to that of the updated cluster infrastructure software is dynamically updated.

As discussed, for example, at page 2, lines 18-29, cluster infrastructure software is analogous in many respects to an "operating system" for a clustered computer system, providing a number of services such as managing the execution of members of a cluster group, providing a programming interface for jobs to invoke cluster-related support functions, etc. Applicants' invention is directed to dynamically updating this type of software in an active clustered computer system, with minimal interruption of availability in the system. As noted, for example at page 14, lines 20-25, updates to cluster infrastructure software may be performed, for example, to fix bugs in the software and/or to add new features or functions.

In rejecting claim 1, the Examiner relies on Arendt, and specifically a number of passages at cols. 2 and 4-6 thereof. Arendt, however, is explicitly directed to performing configuration changes in a clustered computer system, which are conceptually different from updates to cluster infrastructure software. As described at col. 1, line 47 to col. 2, line 18, an "active configuration" in Arendt describes a set of hardware and software entities and relationships therebetween that describe the current state of a cluster. Configuration information may specify, for example, the number and identity of active

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nodes, failover policies, the assignment of resources to particular nodes, etc. In this regard, two examples of configuration changes are supplied in the cited passage: a change in a primary node for an application server to a node that has been upgraded to include a faster processor and/or more memory, and a transfer of an application server to a less loaded node when one node is currently overloaded.

It is important to note, however, that the configuration changes described in Arendt do not refer to modifications being made to the underlying cluster infrastructure software that is running on each node. Conceptually, the configuration changes in Arendt refer to changes to the state of the cluster as recognized by the cluster infrastructure software, rather than changes to how the software functions given a particular state. Put another way, Arendt represents a change in configuration data used by program code, rather than a change in the program code itself.

Applicants therefore respectfully submit that Arendt does not disclose or suggest a method of dynamically updating a version of cluster infrastructure software in a clustered computer system, as claimed in claim 1. Nonetheless, to further clarify the distinction between a configuration change and an update to cluster infrastructure software, claim 1 has been amended to clarify that the update of the cluster infrastructure software is from a first version to a second version, where the second version of the cluster infrastructure software has different program code from the first version of the cluster infrastructure software. Support for this amendment may be found, for example, at page 14 of the Application. It will be appreciated that any installation of a different version of software will necessarily result in different program code, whether such differences incorporate modifications to program code, the addition of new program code and/or the removal of existing program code.

Arendt is directed to handling changes in configuration data, and is completely silent with respect to changing program code in cluster infrastructure software. Claim 1 is therefore novel over Arendt.

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Moreover, claim 1 is non-obvious over Arendt and the other prior art of record as there is no recognition in the art of a structured manner of dynamically updating cluster infrastructure software in a clustered computer system where the update incorporates changes in the program code for the software. Arendt, as noted above, is directed solely to configuration changes, and suggests no mechanism for updating the underlying cluster infrastructure software. Likewise, Kumar, which the Examiner relies upon for allegedly disclosing the removal and addition of nodes (see ¶4 of the subject Office Action), is directed to configuration changes, and suggests no mechanism for updating the underlying cluster infrastructure software.

Furthermore, given that each cited reference is directed to managing configuration changes in a cluster, each reference presumes that each node in the cluster is running the same cluster infrastructure software to ensure that configuration changes are performed in an orderly and failsafe manner. Claim 1, on the other hand, is directed to the situation where the cluster infrastructure software on individual nodes is itself being updated, a situation that is not contemplated or addressed by any of the cited references. Accordingly, Applicants also submit that claim 1 is also non-obvious over the prior art of record. Reconsideration and allowance of 1, as well as of claims 2-10 which depend therefrom, are therefore respectfully requested.

Next turning to the rejection of independent claims 11 and 18, each of these claims have been amended in a similar manner to claim 1, to recite that the update to the cluster infrastructure software is from a first version to a second version, where the second version of the cluster infrastructure software has different program code from the first version of the cluster infrastructure software. As discussed above in connection with claim 1, Arendt discloses a change in configuration data, but does not disclose any change in a cluster involving a change in program code in cluster infrastructure software. Accordingly, claims 11 and 18 are novel over Arendt, and the rejections thereof should be withdrawn. Furthermore, Arendt and the other prior art of record fail to suggest a

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dynamic mechanism for updating cluster infrastructure software to incorporate different program code in the manner recited in these claims. Claims 11 and 18 are therefore also non-obvious over Arendt and the other prior art of record. Reconsideration and allowance of claims 11 and 18, as well as of claims 12-17 and 19-24 which depend therefrom, are therefore respectfully requested.

Next, with respect to the rejection of independent claim 25, this claim as presently amended generally recites a cluster computer system that includes a plurality of nodes, each having resident thereon cluster infrastructure software, a group including a plurality of group members resident on the plurality of individual nodes, and program code resident on the plurality of nodes. The program code is configured to shutdown and restart individual nodes among the plurality of nodes while maintaining the group in an active state so that the cluster infrastructure software resident on such individual nodes can be updated to incorporate different program code while such individual nodes are shutdown. The program code is also configured to notify the group of the update to the cluster infrastructure software after the cluster infrastructure software has been updated in each of the plurality of nodes, and to dynamically update a cluster infrastructure version used by the group to that of the updated cluster infrastructure software.

Claim 25 is rejected as being obvious in light of Arendt and Kumar. As noted above in connection with claim 1, however, both Arendt and Kumar disclose changes in cluster configuration data, but do not disclose any change in a cluster involving a change in program code in cluster infrastructure software. Neither reference suggests a dynamic mechanism for updating cluster infrastructure software to incorporate different program code in the manner recited in the claim, and accordingly, the proposed combination of these references falls short of teaching each and every limitation of the claim. Claim 25 is therefore non-obvious over Arendt and Kumar, and the rejection thereof should be withdrawn. Reconsideration and allowance of claim 25, as well as of claims 26-31 which depend therefrom, are therefore respectfully requested.

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As a final matter, while Applicants traverse the Examiner's rejections of the dependent claims based upon their dependency upon the aforementioned independent claims, Applicants wish to note a number of these claims that recite additional subject matter not disclosed or suggested by the prior art of record. For example, with respect to claims 2, 12, 19 and 26, which refer to the addition of a new function in the updated cluster infrastructure software, the Examiner relies on col. 2 lines 33-60 of Arendt, which is merely a statement of a need to improve a clustered computer system to support new functionality. This statement of need, however, falls far short of disclosing any software update mechanism that enables a cluster infrastructure to be updated dynamically, and with access to a new function being provided subsequent to the update.

In addition, claim 4 recites that updating the cluster infrastructure software includes installing cluster infrastructure software. The Examiner asserts such functionality is disclosed in Kumar; however, Kumar discloses only a configuration change, which as noted above, refers to a change in cluster state, rather than a change in the underlying software.

Furthermore, with respect to claims 10, 17, 24, and 31, each of these claims recites determining whether a node is capable of running updated cluster infrastructure software. The Examiner relies on Official Notice, apparently based upon the theory that a system check is often performed on a system prior to installation of software. Notably, the Examiner appears to focus on system checking in a single system. On the other hand, the aforementioned claims perform checks of whether a node is capable of running updated software within the context of a dynamic, coordinated update process occurring in multiple nodes of a clustered computer system, and in this regard, the Examiner's reliance on Official Notice is deficient in establishing the obviousness of these claims.

In summary, Applicants respectfully submit that all pending claims are novel and non-obvious over the prior art of record. Reconsideration and allowance of all pending claims are therefore respectfully requested. If the Examiner has any questions regarding

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the foregoing, or which might otherwise further this case onto allowance, the Examiner may contact the undersigned at (513) 241-2324. Moreover, if any other charges or credits are necessary to complete this communication, please apply them to Deposit Account 23-3000.

Respectfully submitted,

15 JUNE 2005

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